

# CENTER FOR NANOSCALE MATERIALS SCIENTIFIC CONTACTS

## Nanofabrication and Devices

**Anirudha Sumant (Group Leader)** ..... sumant@anl.gov  
superlubricity, diamond-based NEMS, CNT, graphene  
wear/friction measurements

**David Czaplewski** ..... dczaplewski@anl.gov  
MEMS/NEMS, electron beam lithography, CVD

**Alan Dibos** ..... adibos@anl.gov  
nanophotonics

**Ralu Divan** ..... divan@anl.gov  
electron beam lithography, nanogels, MEMS/NEMS

**Xu Han** ..... xu.han@anl.gov  
high-frequency piezo-optomechanical spectroscopy, CVD

**Dafei Jin** ..... djin@anl.gov  
ultralow temperature/strong magnetic field measurement,  
FIB/SEM dual beam imaging and patterning

**C. Suzanne Miller** ..... csmiller@anl.gov  
XeF<sub>2</sub>, evaporation, RTP, dicing saw

**Fubo Rao** ..... clean room manager

**Liliana Stan** ..... lstan@anl.gov  
ALD, PVD, sputtering, evaporation

### MAJOR TOOLS

- JEOL 8100FS, 100kV electron beam lithography
- Raith 150, 30kV electron beam lithography
- FEI Nova 600 NanoLab DualBeam FIB/SEM
- Karl Suss MA6 Optical mass aligner
- ASML PAS 5000 wafer stepper
- Direct write optical lithography
- Interferometric lithography
- Xactix XeF<sub>2</sub> etcher
- BlueFors LD400 10mK Dilution Refrigerator System
- AMI 5-1-Tesla Vector Magnet
- Wet chemistry & metrology
- Bruker FastScan AFM
- Deposition (Temescal ebeam evaporators, AJAs, atomic layer deposition (ALD), etc.)
- Lambda microwave plasma CVD nanocrystalline diamond
- Thermal/PECVD for CNT/graphene synthesis
- Tribometer for friction and wear measurements
- Sonotek Ultrasonic Spray Coating System
- Piezo-Optomechanical Spectrometer (POMS)

## Quantum and Energy Materials

**Nathan Guisinger (Group Leader)** ..... nguisinger@anl.gov  
UHV STM, AFM, 2-D materials, STS, cryo-STM

**Brandon Fisher** ..... bfisher@anl.gov  
XRD, magnetometry, electrical measurements

**Jeffrey Guest** ..... jrguest@anl.gov  
STM, laser spectroscopy, ambient AFM, EPR

**Saw Wai Hla** ..... shla@anl.gov  
LT-STM, SP-STM, AFM, SX-STM

**Xiao-Min Lin** ..... xmlin@anl.gov  
synthesis of nanocrystals, TGA/DSC, rotating disk electrode, rheometry at Sector 8 of APS, glovebox

**Volker Rose** ..... vrose@anl.gov  
synchrotron X-ray scanning tunneling microscopy

**Dan Rosenmann** ..... rosenmann@anl.gov  
evaporation, deposition, sputtering

**Nozomi Shirato** ..... nshirato@anl.gov  
synchrotron X-ray scanning tunneling microscopy

### MAJOR TOOLS

- UHV SPM (AFM/STM) (Omicron)
- VT-AFM (Omicron XA) with optical access
- Createc LT-STM
- Cryo-STM w/magnetic field
- Scanning probe microscope, AFM (Veeco)
- Kurt Lesker electron beam evaporator and sputtering, deposition
- Agilent ICP-OES
- FT-IR w/ Hyperion Microscope
- Magnetometry (QD PPMS & MPMS)
- TGA/DSC
- Luminescence/UV-vis-NIR
- X-ray diffractometer (Bruker D2 & D8)
- Integrated glovebox system
- Synchrotron X-ray STM (SX-STM) at Sector 4 of APS
- RheoXPCS/SAXS at Sector 8 of APS

## CONTACT

**Ike Arslan**  
Director  
Phone: 630-252-1251  
Email: arslan@anl.gov  
[www.anl.gov/cnm](http://www.anl.gov/cnm)

## Gary Wiederrecht

Deputy Director  
Phone: 630-252-4586  
Email: wiederrecht@anl.gov  
[www.anl.gov/cnm](http://www.anl.gov/cnm)

## Connie Pfeiffer

User Program Manager  
Phone: 630-252-6952  
Email: cpfeiffer@anl.gov or  
cnm\_useroffice@anl.gov  
[www.anl.gov/cnm](http://www.anl.gov/cnm)

## Theory and Modeling

### Subramanian Sankaranarayanan (Group Leader)

ssankaranarayanan@anl.gov  
nanoscale oxide energy materials, machine learning

**Henry Chan** ..... hchan@anl.gov  
multi-scale modeling, soft materials, AI/ML for imaging and inverse design, scientific software development

**Maria Chan** ..... mchan@anl.gov  
photovoltaics, photocatalysts, thermoelectrics, batteries, informatics, atomistic modeling integration w/expt

**Pierre Darancet** ..... pdarancet@anl.gov  
charge and energy transport, optoelectronics; exciton dynamics

**Stephen Gray** ..... gray@anl.gov  
nanophotonics, electrodynamics

**Michael Sternberg** ..... sternberg@anl.gov  
software development

### MAJOR TOOLS

- Nanoscience Computational Facility 30 TFlop cluster for:
- Density-functional-based tight-binding
- Time-domain nanophotonics simulation
- MPI-based parallel versions of nanophotonics and tight-binding codes
- GPAW; real space, grid-based DFT-PAW
- Access to Argonne computer facilities
- Support for experimental projects
- Support for theoretical projects
- (DFTB) electronic structure package
- BLAST
- FANTASTX

## Nanophotonics and Biofunctional Structures

**Richard Schaller (Group Leader)** ..... schaller@anl.gov  
transient absorption/emission spectroscopy, solar energy

**Benjamin Diroll** ..... bdiroll@anl.gov  
synthesis, time-resolved spectroscopy

**Chris Fry** ..... hfry@anl.gov  
synthesis, peptide synthesis, HPLC, CD, EPR

**David Gosztola** ..... gosztola@anl.gov  
lasers, Raman microscopy

**Xuedan Ma** ..... xuedan.ma@anl.gov  
single molecule/particle spectroscopy

**Elena Rozhkova** ..... rozhkova@anl.gov  
bio(in)organic, biological chemistry, synthetic biology, GC/MS

**Elena Shevchenko** ..... eshevchenko@anl.gov  
2-D and 3-D nanoparticle assembly, SEM

**Jie Xu** ..... xuj@anl.gov  
modular robotic workflow for synthesis and processing, polymer processing, wearable electronic devices

### MAJOR TOOLS

- Ultrafast transient absorption spectroscopy
- Confocal Raman microscope, Renishaw
- VIS/NIR microscopy
- Time-resolved emission spectroscopy
- Time-correlated single photon counting
- UV-to-THz ultrafast spectroscopy
- Single photon microscope for optics (SNSPD)
- Fluorescence spectroscopy
- Field-emission SEM (JEOL JSM7500F)
- Electron paramagnetic resonance (Bruker)
- Peptide synthesizer
- Adiabatic demagnetization refrigerator (ADR)
- Functionalization, electro/photo-chemical
- HPLC, GCMS
- Laser Scanning Confocal Microscope (Zeiss)
- Post-self-assembly processing
- ZetaSizer Nano, Malvern
- Solar simulator, QEMS (Oriel)
- FTIR (Thermo-Nicolet)
- Synthesis & surface modification of nanoparticles
- Magneto-Electrical-Optical Spectrometer (MEOS)
- Microfluidic Droplet Generation and Imaging

## Electron and X-ray Microscopy

**Martin Holt (Group Leader)** ..... mvholt@anl.gov  
X-ray diffraction, ptychography and fluorescence

### Electron Microscopy

**Tom Gage** ..... tgage@anl.gov  
Ultrafast electron microscopy (UEM)

**Rachel Koritala** ..... koritala@anl.gov  
SEM/TEM trainer

**Haihua Liu** ..... haihua.liu@anl.gov  
UEM, TEM, STEM, EELS, SAED

**Yuzi Liu** ..... yuziliu@anl.gov  
analytical TEM, in situ TEM

**Jianguo Wen** ..... jwen@anl.gov  
ACAT, TEM, batteries, PV

### Synchrotron X-ray Microscopy

**Tao Zhou** ..... tzhou@anl.gov  
X-ray diffraction

### MAJOR TOOLS

#### **Electron Microscopy**

- ACAT: Argonne Chromatic Aberration -corrected TEM
- UEM: Ultrafast Electron Microscopy
- FEI Talos F200X TEM/STEM
- FEI Tecnai F20ST TEM/STEM
- Field-emission TEM (JEOL 2100F)
- Zeiss 1540XB FIB-SEM
- Zeiss NVision FIB-SEM
- Hitachi S-4700-II high-vacuum SEM
- FEI Quanta 400F environmental and variable-pressure SEM

#### **X-ray Microscopy**

- Hard X-ray nanoprobe beamline, Sector 26 of APS
- Scanning nanodiffraction and ptychography
- Chemical and structural nanoimaging
- Heating/cooling specimen stage
- 20-30 nm resolution, 6-12 keV
- In situ/in operando experiments